DOCUMENT RESUME

ED 426 732 JC 990 061

AUTHOR	Jacobsen, D. Michele; Mueller, John H.
TITLE	Creating a Collaborative Electronic Community of Education Scholars.
PUB DATE	1998-04-00
NOTE	12p.; Paper contributed to the Teaching in the Community Colleges Online Conference (3rd, Kapiolani Community College, April 7-9, 1998).
AVAILABLE FROM	Web site: http://leahi.kcc.hawaii.edu/org/tcon98/paper/jacobsen.html
PUB TYPE	Reports - Descriptive (141) -- Speeches/Meeting Papers (150)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	*Computer Literacy; *Course Objectives; Curriculum Development; *Educational Technology; Foreign Countries; Higher Education; Program Design; *Teacher Education; Teaching Methods; Undergraduate Study; World Wide Web

ABSTRACT

This paper discusses the design and outcomes of an undergraduate education course that used current communication technology. A collaborative, electronic community was developed by pre-service teachers studying educational technology in order to publish, exchange and consider emerging ideas about the use of computers for teaching and learning. In response to research and theoretical readings, as well as commentary and discussions about the use of computers in education and by society, students posted their coursework on individual World Wide Web pages in order to increase the audience for their ideas and to generate response. Described in this document are the course of study, course participants, and coursework assigned including electronic portfolio, laboratory work, and examinations. Also covered are the technology integration plan, student feedback, benefits and drawbacks of the program, effects on writing, instructions on building Web pages, and finally, future teaching careers. The course instructors believe this teaching method, especially the electronic portfolio assignment, contributed to the development of highly marketable educational technology skills among participating students. (AS)

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Creating a Collaborative Electronic Community of Education Scholars

D. Michele Jacobsen
John H. Mueller

Calgary University

Presented via the Teaching In The Community Colleges Online Conference, 1998

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CREATING A COLLABORATIVE ELECTRONIC COMMUNITY OF EDUCATION SCHOLARS

D. Michele Jacobsen and John. H. Mueller, University of Calgary <dmjacobs@acs.ucalgary.ca>

INTRODUCTION

Pre-service teachers studying educational technology participated in a collaborative, electronic community to publish, exchange and consider emerging ideas about the use of computers for teaching and learning. In response to research and theoretical readings, as well as commentary and discussion about the use of computers in education and by society, students posted the results of their coursework and investigation on an individual World Wide Web homepage in order to increase the audience for their ideas, and to generate response. Students created a web-based, electronic portfolio to publish their coursework, as well as to demonstrate their application of screen and information design skills. Coursework included accessing the ideas of other students for the purpose of comparison with their own, and evaluation of other student's work as a potential professional resource. Students also drafted a Technology Integration Plan for their chosen teaching area, which included attention to hardware and software resources needs, instructional methods based on learning theory, software reviews, and assessment and evaluation methods. Pre-service teachers also downloaded and evaluated instructional courseware as potential technology resources for their classroom, as well as searching for and evaluating web sites using published criteria. This paper discusses the design of professional development of preservice teachers and the results of the integration and use of current communication technology in an undergraduate educational technology course to create an on-line community of scholars.

COURSE OF STUDY

Our undergraduate education course combined an analysis of current learning theory and educational technology research with practical activities to investigate the application of technology for teaching and learning. The guiding philosophy for this course was the belief that knowing WHY a classroom teacher uses a given technology resource is as important as knowing HOW to use it. Equal emphasis was given to examining the rationale for integrating technology into teaching and learning, evaluating current and projected uses of technology across subject areas, and acquiring skills using various computer-based tools. Students were introduced to educational computing applications in various computer environments and platforms (i.e., Windows 95, Macintosh, and UNIX).

We organized the course to address instructional objectives that are closely aligned with our provincial Department of Education's mandate for the professional development of inservice teachers:

1. To analyze teaching and learning issues related to the use of computers in educational settings,
2. To examine both the potential and the limitations of educational computer use,
3. To provide a forum for discussion of conceptual issues related to educational computing,
4. To participate in a collaborative, electronic community to publish, exchange and consider emerging ideas,

5. To engage in practical exercises that have classroom application, both in terms of applications tools and instructional tools, and
6. To acquire some proficiency in the use of various educational computer applications. Classroom based lectures, coursework, and hands-on laboratory activities were constructed and organized to address these six instructional objectives.

COURSE PARTICIPANTS

Because our course is offered as an elective without prerequisite courses in educational technology, our students' prior computer experience and knowledge can range from never having used a computer to having extensive programming expertise. Therefore, in order to effectively plan and organize the laboratory activities, we conducted a survey during the first class meeting to collect information about student^"s teaching career plans and specialty area, previous computing experience and courses, and K-12 computer use patterns.

Most of the undergraduate education students (n=35) who registered in the two sections of our elective course were pursuing a bachelor of education degree or after degree and had between three and six years of University or college experience. Approximately 60% of these students had completed the practicum teaching component of their program, and therefore had some classroom teaching experience and knowledge. More than half of the students were planning to teach at the secondary level (i.e., grades 7 to 12) across a range of subject specialties (i.e., French, Math, Social Studies, Music, English, Science) with the remaining students preparing for careers in elementary, post-secondary, and special education. The majority of students had taken a compulsory education course in educational technology, a few students had taken courses in computing science and computer engineering, and a small number had no previous university or college courses on computing. All but two of the students had a computer at home.

In response to a question about prior computer use during their K-12 schooling, students who had used computers in school indicated that the most prevalent use was word processing. A small number of students had been exposed to computers for data and information processing, desktop publishing, programming, and games. About 30% of the students had not used computers at all in their primary schooling.

Students had high expectations for the outcomes of this course. When asked about their own goals for the course, students indicated that they wanted to increase their knowledge and skill with educational computer applications for both personal and professional use, classroom integration, appropriate uses with various age groups, evaluate software for second language learning, designing useful web pages, and develop expertise in various aspects of computing.

COURSEWORK: LINKS BETWEEN THEORY AND PRACTICE

Course assignments and six hands-on laboratory activities were designed in such a way that students would be exposed to progressive levels of challenge in using the technology to complete and share their coursework on-line. Laboratory assignments required the use of basic computer skills and competencies first, such as word processing and email, and then progressed to the more challenging task of posting their assignments to a World Wide Web site. Our goal was to offer a challenging curriculum, but one that would also ease students into using computer technology for authentic tasks related to the theoretical investigation and discussions in lecture.

ELECTRONIC PORTFOLIO

An integral component of our course was the creation of a collaborative, electronic community that enabled students to publish, exchange and consider emerging ideas related to our shared investigation of educational technology. Each student designed and published a personal electronic, World Wide

Web-based portfolio using HTML which included (but was not limited to):

1. A justification for web-page design decisions (either from literature or the Web),
2. All lab assignments, and
3. their Technology Integration Plan.

Learning how to publish ideas electronically allowed our preservice teachers to engage in practical exercises that have classroom application, both in terms of applications tools and instructional tools, and to acquire some proficiency in the use of various educational computer applications. The electronic portfolio was publicly accessible on the World Wide Web. Therefore, students were encouraged to consider and remain aware of their portfolios^" value as a professional resource, and the scholarly nature of their work.

The electronic portfolio was a summative assignment that was eventually assessed for content, design, and technical soundness. Students were responsible for including all of the required content, using correct spelling, punctuation, and grammar, as well as avoiding the use of questionable vocabulary and slang terms. Students had to demonstrate good screen and information design principles with their web page construction, as well as arrange content in logical and accessible ways so that the user had control over navigation within the web-based portfolio. To make use seamless, the web pages and media had to be technically sound (i.e., load consistently, without error, from the University server), and each link had to somehow indicate the destination and work as expected.

LABORATORY ASSIGNMENTS

The first three laboratory assignments, reading and responding to research, were similar in nature to activities that students would have experienced in other courses except that they also required the use of technology. For the first assignment, students read and responded to Howard's (1994) article about the adult first-time computer experience. Students word processed and e-mailed their responses to the instructor by the third week of the course, and posted their response to their web-based electronic portfolio by the fourth week of the course. This timeline gave students with no prior skill three weeks to gain experience with word processing and e-mail, and four weeks to learn how to post a text-based document to a web site. The instructor created a web page with links to all of the student^"s web pages on the course web site, from which students could access other student's web pages.

The second and third lab assignments gave students valuable additional practice with electronic publishing. The second laboratory assignment, a response to chapters from Papert's (1980) book MINDSTORMS, was posted to the student^"s web-based electronic portfolio by the fourth week of the course. Students posted their responses to the third lab assignment, which focused on readings from Norman's (1993) book, Things that Make Us Smart: Defending Human Attributes in the Age of the Machine, in the fifth week of class.

Subsequent laboratory assignments required students to use technology in a variety of ways that directly relate to how teachers use computers in schools: 1. software evaluation, 2. WWW site evaluation, and 3. collaboration with peers.

The fourth lab assignment on software evaluation required students to learn and apply a variety of technological and pedagogical skills:

1. obtaining and examining instructional resources on-line,
2. searching the World Wide Web for instructional resources,
3. locating, downloading and using software from the Internet, and
4. applying evaluation criteria to shareware and freeware to determine the usefulness of various on-line

resources for classroom integration.

Students were encouraged to complete the fourth lab assignment, software evaluation of instructional courseware (i.e., tutorial, drill & practice, simulation, games, or problem-solving software), with a partner. Our rationale for self-chosen partner- based work was to emphasize that purchasing decisions about computer-based resources and materials should not be an isolated, one-person activity, but rather should be a collaborative effort among the teachers who would use the resources. Students used the 'Recommended Courseware Evaluation Criteria' published in Roblyer, et al.(1997). Students discussing the criteria with their partner, helped them to develop an appreciation for others' viewpoints about the relative benefits of a piece of courseware. Although students were evaluating software obtained on-line, we believe that this experience transfers directly to the evaluation of commercially available educational software. Students demonstrated and discussed their chosen software and evaluation in groups during lab time, and posted a summary of their courseware evaluations on their growing web-based, electronic portfolio by the seventh week of the course.

The goals of lab five were to develop an awareness of screen and information design principles as they apply to the WWW, as well as to evaluate the credibility of on-line information sources. Using WWW search engines and strategies, students located, selected and evaluated seven WWW sites using the framework developed by Ryder & Hughes (1997) to evaluate on-line information. Students were required to choose a web site that presented WWW design guidelines, five web sites in their chosen teaching area, and a poorly designed web site. A summary of their seven WWW site evaluations and the site URLs was posted on their web-based electronic portfolio by the tenth week of class. The evaluation of information available on the WWW is a particularly timely activity given parental concern over the increased access to the Internet that children now enjoy in school.

In order to encourage a scholarly evaluation of their colleagues coursework, the sixth lab required students to access another student's web-page and review the student's postings for Labs 1 through 3, and note any similarities and differences when compared to their own postings for these labs. Additionally, their task was to review Labs 4 and 5, and assess the potential educational value of these postings for educators. Students were asked to e-mail their fellow student if they noticed any typos, etc., that should be fixed. Students posted a summary of their findings, and link(s) to the student's web-page(s), on their web-based electronic portfolio by the eleventh week of class. One of the difficulties that students experienced in their attempts to complete this lab was a concern that criticism would hurt their relationship with the other student. A discussion in lecture about the benefits of interacting in a collegial way with fellow teachers, and discussing things openly for the improvement of all was a valuable method for diffusing concerns about 'saying something that wasn't nice' about a peer's work.

EXAMINATIONS

In order to assess students understanding of the content addressed in lectures, labs, the readings and texts, an open-book midterm exam was scheduled for the eighth week of the course. Students were allowed to bring any course material they felt would be helpful for use during the exam. Midterm questions were short-answer, matching, and essay type items that emphasized synthesis and evaluation of broad issues and concepts, not memorization and recall of facts and figures. Students were advised that effective preparation for this type of exam included reading for comprehension all assigned chapters and readings (i.e., review chapter objectives, attempt end-of-chapter activities, create concept maps while note-taking) and actively participating in lectures and labs.

Although we did not use this approach in our course, an additional way to integrate technology in an authentic way for our students would be to allow them to write the midterm exam using word processors. Schools are currently experimenting with this form of test taking, and it may help future teachers to

develop a sensitivity and awareness of the needs and issues that their own students may face if and when they write examinations using a word processor.

A take-home final exam was distributed to students in the eleventh week of the course. Exam questions were divided into short answer and essay items that emphasized analysis, synthesis and evaluation of broad issues and concepts, as well as knowledge, comprehension and application of course content. Students were given two weeks to write the exam, which was turned in to the instructors in the thirteenth week of the course. Students were encouraged to use any resources available to them for the examination questions. Collaboration and consultation with other students and experts was encouraged. However, it was expected and required that each student submit individual answers to the exam questions.

TECHNOLOGY INTEGRATION PLAN

School divisions in our province often require individual schools to construct an outcomes-based technology plan for the integration of technology for teaching and learning. In order to give students practical experience with this divisional requirement, as well as to provide a summative assignment that would integrate the various topics addressed throughout the course, students were required to develop a Technology Integration Plan with a partner for their chosen teaching area. The technology integration plan had to include instructional objectives, a description of their student population and the hardware/software resources needed, and a description of their instructional methods based on constructivist and or directed instructional approaches. The Plan was to include a review of an example from each of the following software categories, with a general critique of the adequacies and inadequacies which may lead one to select the software for a student population:

1. Instructional software,
2. Productivity software,
3. Hypermedia/Multimedia, and
4. Distance technologies.

Because this was an outcome-based plan, students had to describe and justify student assessment and evaluation methods related to both the chosen computer applications and instructional objectives, identify expected teacher and student learning outcomes as a result of technology integration, and provide an explanation of how a teacher might determine whether integration is/was successful.

In order to benefit from feedback and share their findings with the scholarly community of their peers, students prepared an in-class presentation using PowerPoint which summarized the main points of their Technology Integration Plan, as well as publishing their Plan on their web-based electronic portfolios.

STUDENT FEEDBACK

We predicted that the electronic portfolio would be both a challenging and an innovative way for students to publish and share the results of their coursework. Our observations in the lab and informal comments from students in lecture and through e-mail kept us informed about their progress while they learned to use HTML, and confirmed our predictions about some of the challenges involved in electronic publishing. In order to inform our planning of future educational technology courses, we conducted an anonymous, paper-based survey at the end of the course to gather student feedback about the electronic portfolio assignment as well as other aspects of the course.

In this course, we broke away from the traditional approach to instruction that has students writing assignments for an audience of one: the instructor. In our course, students were literally publishing their work for a 'world audience'. We were curious about whether students had taken advantage of the opportunity to access each other's on-line postings. In response to a question about how many of the other

student^"s web pages they had visited, students indicated that they had visited all of the other student's web pages in order to read what others had written, observe how others had designed and organized their on-line postings, and to get ideas for how to arrange graphics, use color, format text, etc. One student wrote, 'It was very useful to be able to see what others did and why. It generated ideas.' We concluded that the ability to access other students^" work was a valuable aspect of our on-line learning community, in that students benefited from benchmarks or models of other student's writing, screen and information design, and organization of media.

BENEFITS

Although student opinion about the relative benefits of publishing individual coursework on the Web varied from 'somewhat' to 'very' beneficial, almost all of the students agreed that learning HTML was valuable to them as future educators. The following are some of the student's comments:

> "I think it is a great idea. It made me more aware of what I was writing. I liked being able to see how others responded to the questions. It helped me in assessment of myself. I believe this would have benefits in the classroom for children in sharing their work with parents and others as well as giving them more confidence."
>
> "I found that publishing coursework on the web to be very beneficial. It was a meaningful way to learn how to publish a web site and having your peers as your audience encourages you to make your site very presentable."
>
> "I enjoyed learning to create a web page. I would definitely want to do this with my students. I do, however, feel that HTML is very difficult to use."

DRAWBACKS

We were interested in students' perceptions of any drawbacks to other students^" having access to their work via the Electronic Portfolio. Most of the students felt that there were no major drawbacks to publishing their work electronically. However, a concern that arose early in the course, and was expressed by a small number of students at the end of the course, was the ease with which one could copy another student's on-line work. In response to our survey, one student wrote, 'If a student was dishonest they could copy ideas of others. This is very easy to plagiarize. Or, it might take away one's own originality.' Because of the relatively small size of our class, and the nature of the peer review assignment, we believed that it was more difficult for an individual student to get away with cheating. As previously mentioned, students indicated that they accessed all of the other student's pages, so one can assume that they would notice whether another student had 'borrowed' their ideas. As well, one has to consider that the very nature of this 'public' work made it very unappealing to cheat. It was too easy to get 'found out' in this size of class. However, in a larger class it may be more difficult for both the instructor and the students to monitor and follow-up on copying or cheating.

A second concern, or possible drawback, to universal access to each other's on-line work is that it '...might take away one's own originality'. Students wondered about the possible 'homogenizing' of student responses. One student suggested that there were '...probably a lot more similarities than differences because everyone feels that someone else is on the right track and then tries to tailor their project closer to the other person's '. Another student suggested that "...maybe some students would feel inhibited about expressing their true opinions in order to be 'polite' and non-controversial." We tended to believe that student work improved overall from the sharing of good ideas, or good web page design. We felt that the sharing of work in a scholarly community was similar to a native 'gift' economy where you give away your best ideas so that others can build and extend your good work. As to suppressing 'true' opinions, one can hope as an instructor to build a culture in the classroom that welcomes and honors the articulation of one's

true thoughts and feelings about issues, topics and ideas, but one cannot mandate it.

A final concern involves on-line and in-class etiquette, and respect for the work of fellow students. One student comment highlighted this concern: '...although I believe it is very beneficial overall, I did hear some students critically flip through some of the web pages. I believe two students were within earshot (it was in a lab outside of lab hours)'. As a part of classroom instruction and discussion, it is important for the instructor to encourage and remind students to use good judgment and constructive comments when viewing and commenting on another student's efforts.

BUILDING THE WEB PAGE(S)

Our course was divided into a three-hour lecture and two-hour lab time, once per week for fourteen weeks. Students were asked to estimate the amount of time, in addition to the time invested completing the lab assignments to be published, they spent on creating their Web page(s). Specific responses ranged from 'at least 20 hours over the course of the term' to 'around 40 to 50 hours', while general responses included 'Tons, tons, tons!! using HTML and EMACS' and 'Way too much!'. Students described the various types of activities they spent time on while creating their electronic portfolio: searching the Web for graphics and backgrounds and other sites to link to, figuring out how to do internal links, colors, and positioning graphics, talking with peers about ideas for their page, researching in "how-to" books, learning how to transfer files (upload) and convert word files to HTML, and word processing to ensure that the lab was completed pretty well weekly.

The two of us have been helping students to construct web pages for a number of years, and over that time and in this course we have both found that student interest and investment in designing and creating web pages varies in predictable ways. Students appear to fall into categories that are similar to two of the technotypes described by Weil and Rosen (1998): eager adopters and hesitant prove-its. Because this courses was elective, we do not believe the course attracts students whom Weil and Rosen (1998) would describe as 'resistors' to technology.

EAGER ADOPTERS tend to make up only 10 to 15% of the population, love technology and are the first to adopt new technological gadgets because they view technology as fun and challenging. Individuals of this type enjoy playing and tinkering with software tools because technology itself holds a high, intrinsic attraction and solving technical problems can be fulfilling and satisfying. When problems arise, they usually figure out a solution or find someone who can, and they expect to have problems with technology, so when problems arise, they do not feel they have caused it. We found that students who appeared to be 'eager adopters' spent a great deal of time fiddling with HTML, searching the web, downloading and creating graphics, and fine-tuning their web pages to accommodate various media (i.e., graphics, animations, audio) even though it was not a requirement for grading. These students did not appear to resent the additional time they invested working on their web pages. Although one student admitted that he '...spent more time on style than substance in the assignments... playing with color and font size with the editor...learning how to scan and add pictures...', the actual content of the electronic portfolios did not appear to be neglected in favor of the more technological interests of the eager adopters.

HESITANT PROVE-ITS, who account for about 50 to 60% of the population, do not regard technology as fun, and tend to wait until a technology is "proven" before trying it. This type of individual needs to be convinced he or she needs something before buying it, tends to be willing to try technologies that make life easier, and needs close support and direction. A hesitant prove-it prefers to have detailed instructions, or an exact sequence of steps for using technology, and while those individuals expect that there will be problems with technology, they don't think solving such problems is fun. They tend to personalize technical glitches, assume they created the problem, and do not believe solutions are readily available. Students in our course that appeared to be 'hesitant prove-its' tended to be more aware of the number of

hours spent on creating the electronic portfolio, and were more uncomfortable with the numerous barriers and bottlenecks that publishing electronically poses than were the eager adopters. The following student comment illustrates the difference: 'I felt very frustrated using HTML. I always (and still do) feel a few steps behind the group. I would have also liked to learn how to use an editor like "Composer". I feel that my mark on my web page should reflect the amount of time I spent on my page using straight HTML programming with little knowledge at the start compared to experienced students who used editors.'

An instructor has to resist the tendency to overestimate the technological comfort of students. Instructors would do well to be aware of the different levels of student interest and motivation for working with technology, the varying levels of persistence, the different learning needs of students, and be willing and able to provide different levels and amounts of support and instruction to address the needs of different student "technotypes". Also, when planning assignments and projects for such a course, it is important to have a grading system that honors and rewards GROWTH as well as the final OUTCOME, so as not to disadvantage those students who enter with no prior computer experience and skill.

EFFECTS ON WRITING

We asked students whether they felt they wrote differently or completed assignments differently as a result of their knowledge that this work would eventually be published on the Web. Writing for a perceived "world-wide" audience appears to have an impact on students^" writing, from being more careful about editing and proofreading, to an attempt to write more concise or brief answers because of the electronic medium:

> '...I found many answers that were fine on paper seemed too long on the Internet...'
>
> 'I wrote more concise and to the point because I did not want a web surfer to wait for pages of text to download, it helped me revise my comments so that any "fluff" or "filler" was eliminated'.

One student described how he underwent an evolution as a writer for the web as he became more familiar with the medium: 'Did I write differently? Yes, I did, but now that I am out of the course and continue to publish information on the site, I am less inhibited, and as I had mentioned on one of my pages, I draw a similar comparison about being conservative on the web page and my conservative style (in the beginning) while as a radio announcer, as time progressed and the novelty (for lack of a better word) wore off, the "real" me began to emerge (for better or worse)'.

FUTURE TEACHING CAREERS

An often unstated, but underlying goal of an undergraduate education degree program is to effectively prepare individuals to enter the education job market. Our province will soon implement policy that requires all newly hired teachers to possess minimum competencies in using and integrating computer technology for teaching and learning. We asked students to describe the knowledge and skills acquired while completing the electronic portfolio that they believe will be of value to them in their future teaching career. The following are some of their comments:

> 'Being aware of what the student will go through such as trying to figure out what they want in their portfolio, how they want it to look, etc. . You as well as your student(s) learn what should go on the web and what should not, such as comments that are of no relevance to the portfolio and keeping graphics to a minimum, it is not an art project. A portfolio allows the student to express themselves to the world and is a solid accomplishment, something they can show others that they did themselves.'

'Patience. When things didn't go right or took a long time. Searching the web, and narrowing them down. Software evaluations and web site evaluations.'

'Ability to create web pages (for schools, to teach students). Familiarity with HTML, EMACS, e-mail. Feel more comfortable with computers in general. I want to incorporate technology into my teaching career.'

'Learned HTML and learned how to conduct searches on the WWW.'

Various experts and technology enthusiasts were invited to speak to the class about their work in schools, on campus, and in industry. Because of the ever changing field of educational technology, and the vast number of tools, applications, and innovative pedagogical methods, no one instructor can hope to provide expert instruction on all areas. Therefore, we greatly value the contribution that invited speakers have made to our course, and the student feedback has been positive:

'Guest speakers were inspiring and relevant. I thought that Castro's (1997) HTML book would be a great asset to the course (I wish I had bought it sooner). I learned a lot and really enjoyed the labs.'

CONCLUDING REMARKS

We believe our approach to designing and teaching this course, and especially the electronic portfolio assignment, has contributed to the development of highly marketable educational technology knowledge and skill amongst our students. We believe that our students, through their interaction and collaboration with others in the class, developed useful coping and problem solving skills, and an educational philosophy that will positively affect and push the envelope for the integration of technology for teaching and learning when they find employment in our schools.

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